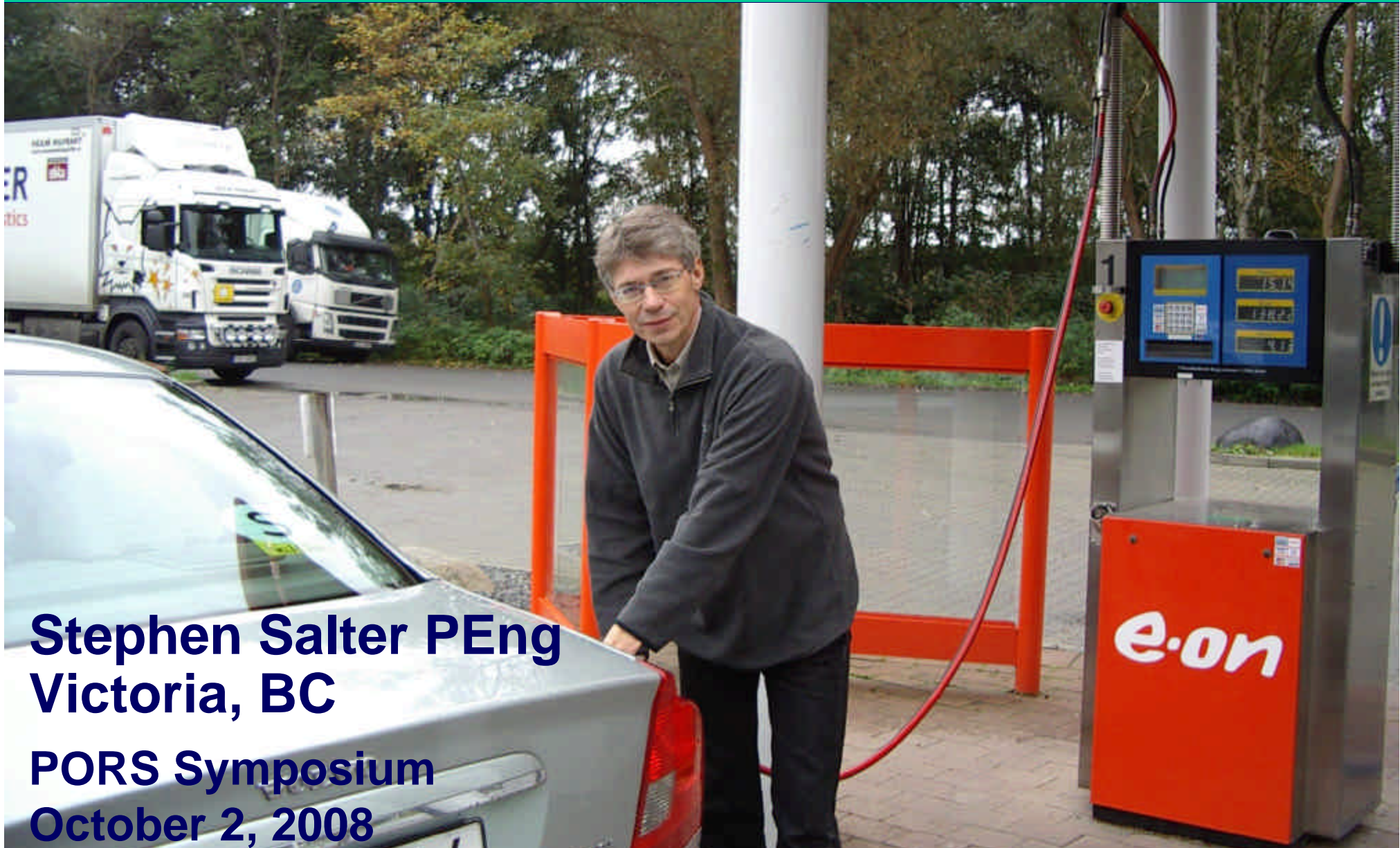


Resources from Waste

Inspiration from Sweden



Stephen Salter PEng
Victoria, BC

PORS Symposium
October 2, 2008

Resources from waste

Outline

- Examples from Sweden
- Distilling out the principles
- Applying the principles at home





In nature, waste = food

*Pollution is nothing but the
resources we are not harvesting.
We allow them to disperse because
we've been ignorant of their value.*

Buckminster Fuller

Resource recovery principles

If every waste is a resource:

1. Integration solves several problems
2. Each waste has a best use/highest value
3. Revenues first, costs second



Stockholm 750,000



Stockholm's Henriksdals treatment plant



The Henriksdals biogas upgrading plant...



...provides biogas for city buses,



... and for the Hammarby Sjöstad development,

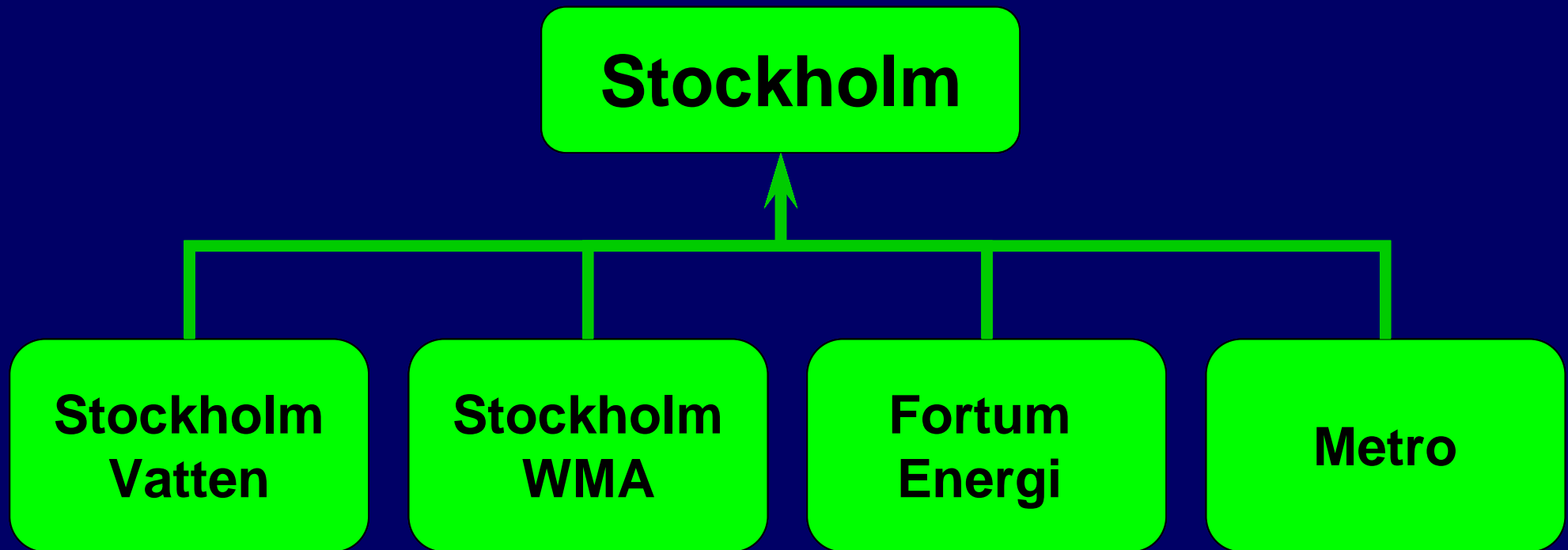


...where kitchen waste is collected for digestion.



1. Integration solves many problems

Swedish for common sense



"Waste and refuse are resources in the wrong place."

City of Stockholm

In the administrative world,
the issues seem separate

Separate goals, staff, and budgets

**Water
Supply**

**Liquid
Waste**

**Solid
Waste**

**Air,
Climate**

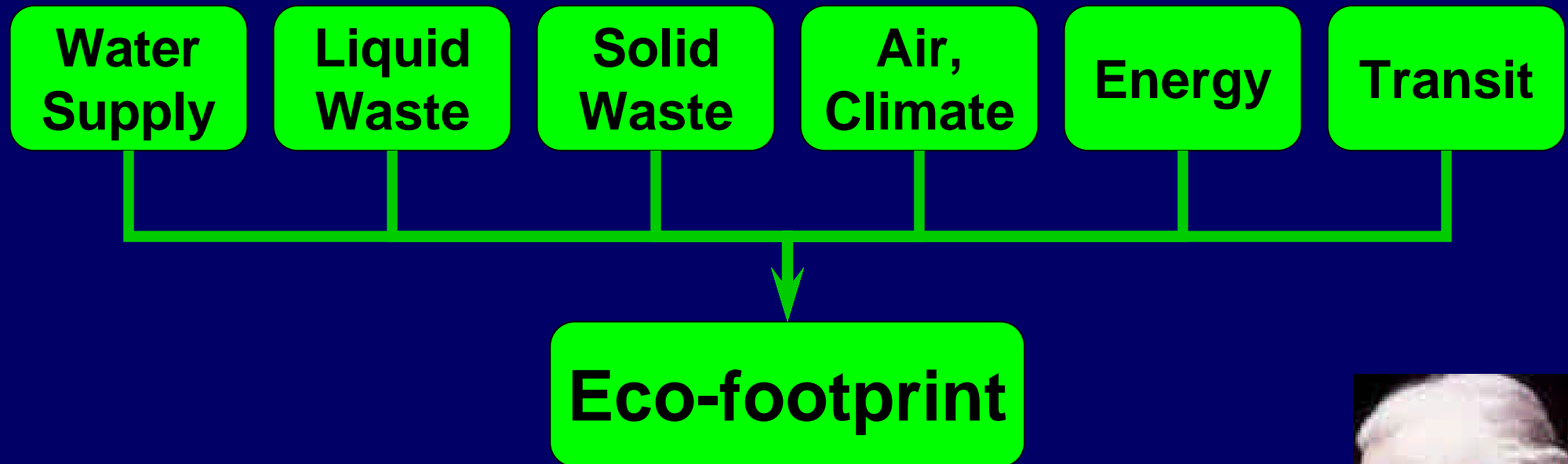
Energy

Transit

Budget

**In the physical world,
*solutions are connected***

Common problems, impacts, and solutions



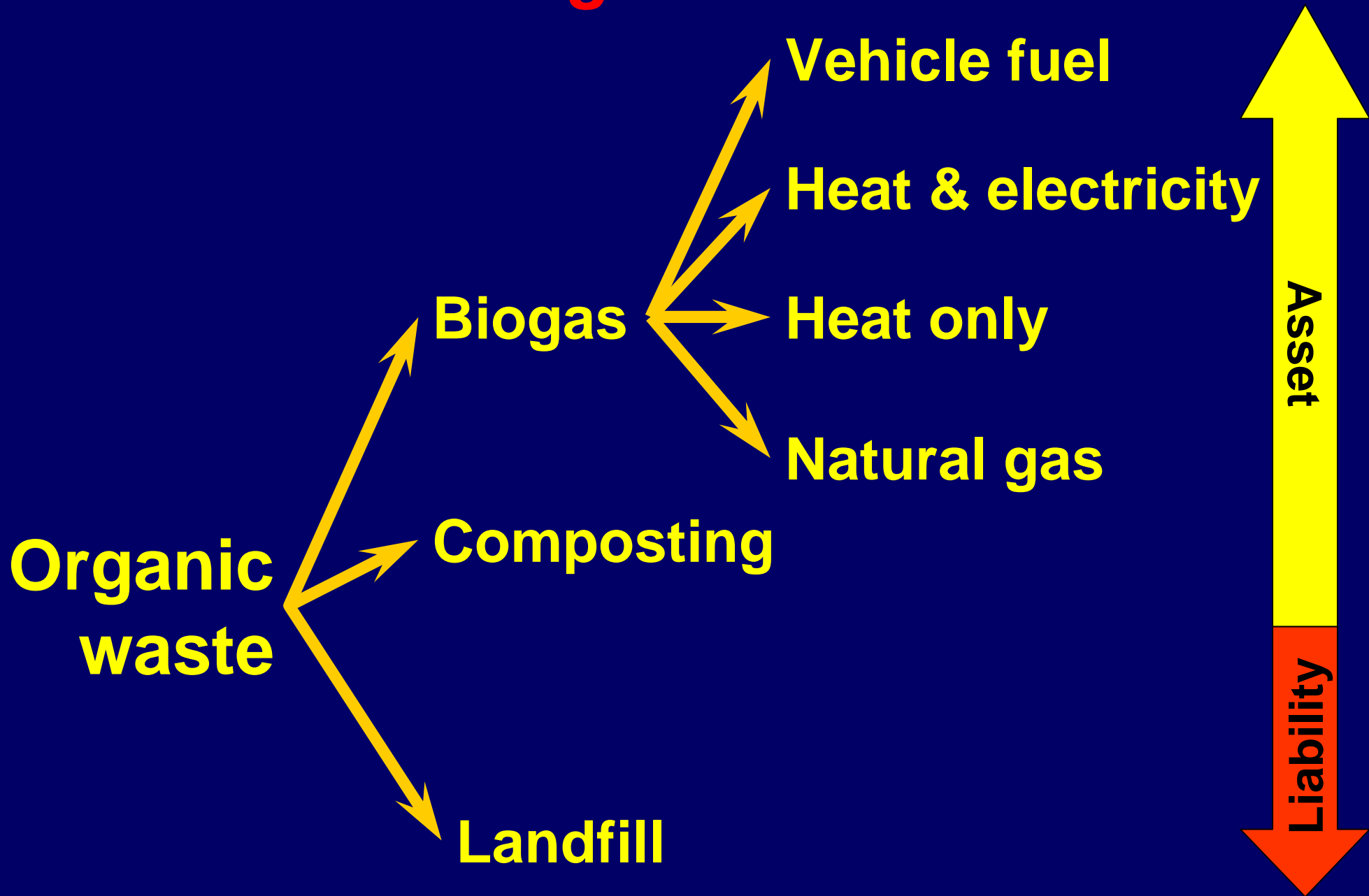
***When we try to pick out anything by itself, we find
it attached to everything else in the universe.***

John Muir, 1892



2. Highest/best use and value

For organic waste



3. Revenues first, costs second

The real value of waste

An integrated approach to waste can:

- **Produce revenues which exceed costs**
- **Reduce community greenhouse gas emissions by 25% below 1990 levels**

**Source: *Resources from Waste, Integrated Resource Management Phase I Study Report*
Province of British Columbia, 2008**

Gothenburg 500,000



Ancient street, new thinking



Gothenburg's biogas digesters



Kristianstad 50,000



Kristianstad collects kitchen waste separately.



"Fossil-Free Kristianstad" has 2 sources of biogas



**Kristianstad's
Biogas Plant**
(food waste)

**Kristianstad's
Wastewater Plant**
(biosolids)



Biogas runs the municipal trucks and buses...



...and taxis...



...and several hundred cars...



Biogas & wood residues power the cogen plant,



...which provides heat for apartments & offices.



The nutrient balance favours farmers

Kitchen Waste

Food Factory Waste

Manure



Residues

Biogas at the pump



Välkommen
E.ON Förs. Sverige AB

KVITTO FÖR TÄNKNING

DATUM OCH TID 2006-10-06 12.00
PUMP 1, BIOGAS

VOLYM 15,84 M3
PRIS 9,13 KR/M3

TOTALT BELOPP 144,61 KR
VARAV MOMS 28,93 KR

KORTBETÄLNING

Transaktionstyp: Köp
(Personlig kod)

Kortnr:

Belastat: Konto

Belopp: SEK 144,61

Kontrollnr: 636046

Refnr: 713

Terminal: 563

1 Nm3 biogas = 1,10 liter bensin

Recovering water from sewage

Dockside Green, Victoria



**Wastewater
Treatment Plant**

Water Feature



Resource Recovery Studies in BC

Quesnel: AD, Industrial Waste Heat, District Heating

Colwood: Decentralized Treatment, Heat & Water Recovery

Royal Roads University: Gasification, Cogen, District Heating

Local Farm: AD, Cogen, District Heating for a Hospital



Summing up

1. Integration solves several problems
2. Each waste has a best use/highest value
3. Revenues first, costs second

